

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Improved transcranial magnetic stimulation coil design with realistic head modeling LAWRENCE CROWTHER, RAVI HADIMANI, DAVID JILES, Department of Electrical and Computer Engineering, Iowa State University — We are investigating Transcranial magnetic stimulation (TMS) as a noninvasive technique based on electromagnetic induction which causes stimulation of the neurons in the brain. TMS can be used as a pain-free alternative to conventional electroconvulsive therapy (ECT) which is still widely implemented for treatment of major depression. Development of improved TMS coils capable of stimulating subcortical regions could also allow TMS to replace invasive deep brain stimulation (DBS) which requires surgical implantation of electrodes in the brain. Our new designs allow new applications of the technique to be established for a variety of diagnostic and therapeutic applications of psychiatric disorders and neurological diseases. Calculation of the fields generated inside the head is vital for the use of this method for treatment. In prior work we have implemented a realistic head model, incorporating inhomogeneous tissue structures and electrical conductivities, allowing the site of neuronal activation to be accurately calculated. We will show how we utilize this model in the development of novel TMS coil designs to improve the depth of penetration and localization of stimulation produced by stimulator coils.

Lawrence Crowther
Department of Electrical and Computer Engineering, Iowa State University

Date submitted: 10 Nov 2012

Electronic form version 1.4